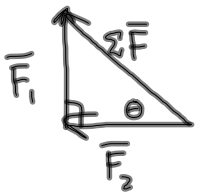
Hockey puck has a mass of .113 kg and is struck with two sticks simultaneously. One stick applies a force of 30 N north, and the other applies a force of 50 N west. What is the acceleration of the puck (magnitude, angle, direction)?



$\vec{F}_1 = 30\ N$ north

$\vec{F}_2 = 50\ N$ west

magnitude of $\Sigma\vec{F}$: Pythagorean thm.

$$\Sigma F = 58.3\ N$$

θ: $\tan^{-1}$ or $\sin^{-1}$ or $\cos^{-1}$

$$\theta = 30.96^\circ$$

direction: N of W

$$\Sigma\vec{F} = m\vec{a}$$

$$a = \frac{\Sigma F}{m}$$

$$= \frac{58.3\ N}{.113\ kg}$$

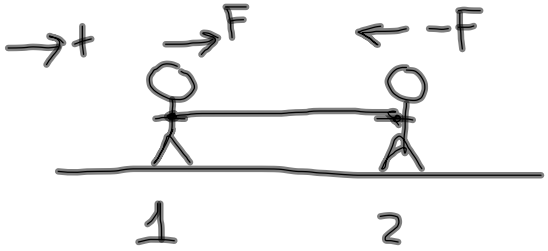
$$= 516\ m/s^2$$

(not realistic)

* angle and direction of net force and acceleration are the same

FBD (looking down on object, ignoring F_N and F_g)

Two people are standing on a frictionless surface connected by a rope. One person has a mass of 60 kg and an acceleration of $2\ m/s^2$. If the mass of the other person is 45 kg, what is their acceleration?



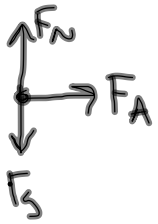
1: $m_1 = 60\ kg \quad a_1 = 2\ m/s$

$$\Sigma F = ma_1$$
$$= (60\ kg)(2\ m/s^2)$$
$$= 120\ N$$

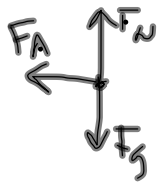
2: $\Sigma F = -120\ N \quad m_2 = 45\ kg$

$$\Sigma \vec{F} = m_2 \vec{a}_2$$
$$a_2 = \frac{-120\ N}{45\ kg} = 2.67\ m/s^2$$

FBD 1:



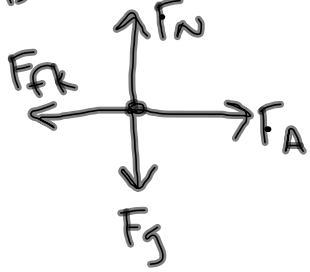
FBD 2:



Coefficient of Kinetic friction when object is pulled at constant velocity:

Picture:

FBD:



$$F_{fk} = \mu_k F_N$$

$$\mu_k = \frac{F_{fk}}{F_N}$$

$$= \frac{F_A}{mg}$$

plug in numbers, get answer

$$\Sigma \vec{F}_x = \emptyset$$

$$\vec{F}_A - \vec{F}_{fk} = \emptyset$$

$$F_{fk} = F_A$$

$$\Sigma F_y = \emptyset$$

$$F_N - F_g = \emptyset$$

$$F_N = F_g$$

$$= mg$$